CLAIMS

What is claimed is:

1. An interconnect structure comprising:

one or more interconnect levels, one on top of each other, each level comprising a organo-silicate glass (OSG) dielectric material having a plasma treated surface layer that provides improved adhesion to an overlying lower hardmask, yet is substantially undamaged.

2. The interconnect structure of Claim 1 wherein the OSG dielectric material comprises a non-porous or porous material having a dielectric constant less than 3.

3. The interconnect structure of Claim 1 wherein the OSG dielectric material comprises a combination of porous and non-porous OSG materials.

4. The interconnect structure of Claim 1 wherein the OSG dielectric material comprises a material of Si, C, O and H and having a dielectric constant less than about 3.

5. The interconnect structure of Claim 4 wherein the OSG dielectric material comprises about 10 to about 40 atomic (at.) % Si, about 10 to about 40 at. % C, about 15 to about 45 at. % O, and about 20 to about 50 at. % H.

6. The interconnect structure of Claim 1 further comprising a dielectric cap layer beneath said OSG dielectric material.

7. The interconnect structure of Claim 1 wherein the lower hardmask comprises a dielectric material of Si, C, O and H and having a dielectric constant less than about 5.

8. The interconnect structure of Claim 1 wherein the lower hardmask comprises of a dielectric material of Si, C, O, H and N and having a dielectric constant less than

about 5.

9. The interconnect structure of Claim 1 wherein the adhesion improved by greater than 15%.

10. The interconnect structure of Claim 1 further comprising an upper hardmask located atop said lower hardmask.

11. The interconnect structure of Claim 10 wherein said lower hardmask does not include a densified surface layer.

12. A method of forming an interconnect structure comprising:

plasma treating an OSG dielectric layer to provide a plasma-treated OSG surface layer that provides improved adhesion to an overlying lower hardmask, said plasma-treated OSG surface layer is chemically and electrical unaltered from the bulk of the OSG dielectric layer; and

forming said lower hardmask atop the plasma-treated OSG surface layer.

13. The method of Claim 12 wherein the plasma treatment is performed in H_2 or He, at a plasma power of less than about 200W and a plasma exposure of less than about 10 sec.

14. The method of Claim 12 wherein the plasma treating causes a variation in the dielectric constant of the OSG dielectric of less than 0.05.

15. The method of Claim 12 wherein the lower hardmask is formed in-situ.

16. The method of Claim 12 further comprising forming an upper hardmask atop the lower hardmask.

17. The method of Claim 16 wherein the upper hardmask is formed in-situ thereby avoiding the need for densifying the lower hardmask prior to upper hardmask deposition.

18. The method of Claim 17 wherein the absence of densifying leads to a reduction in micromask formation during a subsequent reactive ion etch step.

19. A method of forming an interconnect structure comprising:

providing an integrated circuit that includes a dielectric cap layer located thereon;

forming an organo-silicate glass (OSG) dielectric layer on said dielectric cap layer; and

plasma treating the OSG dielectric layer to provide a plasma-treated OSG surface layer that provides improved adhesion to an overlying lower hardmask, said plasma-treated OSG surface layer is chemically and electrical unaltered from the bulk of the OSG dielectric layer;

in-situ forming said lower hardmask atop the plasma-treated OSG surface layer; and

in-situ forming an upper hardmask atop said lower hardmask.